CLAIMS

What is claimed is:

1. An apparatus for illuminating a macroscopically-sized specimen for, upon at least one time, observation along a single viewing axis, the apparatus comprising:

a stage for supporting a specimen to be observed;

one or more first illumination sources radiatively illuminating the specimen upon the stage so that at least some radiation returned from the specimen will be returned along the viewing axis;

at least one dichroic mirror positioned so that at least a portion of the specimen not directly observable along the viewing axis will be reflected in the mirror so as to become observable along the viewing axis; and

one or more second illumination sources radiatively illuminating the specimen on the stage through the at least one dichroic mirror so that at least some radiation reflected from that region of the specimen not directly observable along the viewing axis will become reflected by the dichroic mirror and will become observable along the viewing axis.

2. The apparatus according to claim 1 wherein the at least one dichroic mirror comprises:

a plurality of dichroic mirrors at least two of which plurality are oppositely positioned about the specimen upon the stage;

wherein radiation directly reflected from the specimen along the viewing axis permits an observation called a top view while radiation from the specimen reflected by the at least two dichroic mirrors permits observations called left and right side views.

3. The apparatus according to claim 1 wherein at least one of the one or more first illumination sources is directly illuminating the

specimen upon the stage.

4. The apparatus according to claim 3 wherein two first illumination sources directly illuminate the specimen upon the stage.

5. The apparatus according to claim 1 wherein at least one of the first and the second illumination sources is a fiber optic illumination source.

6. The apparatus according to claim 1 wherein radiation emitted from at least one of the first and the second illumination sources is suitable so as to induce fluorescent emission in the specimen.

7. The apparatus according to claim 1 that, between the at least one dichroic mirror and the specimen upon the stage, further comprises:

a selectively regionally transparent and opaque grid or rule mask, located between the at least one dichroic mirror and the specimen upon the stage, selectively blocking both radiation from the at least one second illumination source through the at least one dichroic mirror to the specimen, and also such radiation reflected from the specimen as is further reflected by the at least one dichroic mirror along the viewing axis, so that a grid pattern or rule scale visually appears upon an image of those specimen regions that are illuminated through, and that are viewed through, the mask.

8. The apparatus according to claim 1 that, between the at least one dichroic mirror and the specimen upon the stage, further comprises:

a color filter.

9. The apparatus according to claim 1 that, between the at least

one dichroic mirror and the specimen upon the stage, further comprises:

a fluorescent image calibration step wedge.

10. To an apparatus holding and illuminating a macroscopically-sized three-dimensional specimen so that about one-half the specimen's surface may be viewed at one time along a single viewing axis, an improvement directed to enabling panoramic viewing of more than one-half of the specimen at one time, the improvement to the apparatus comprising:

a dichroic mirror positioned so that at least a portion of the specimen that is not directly observable along the viewing axis will be reflected in the mirror so as to become observable along the viewing axis; and

an illumination source illuminating the specimen on the stage through the at least one dichroic mirror;

wherein at least some illumination arising from the illumination source that is reflected from that region of the specimen not directly observable along the viewing axis will become reflected by the dichroic mirror and will become observable along the viewing axis;

wherein more than one-half of the surface of specimen is panoramically viewable along the single viewing axis at the one time.

11. The improvement to a specimen holding and illuminating apparatus according to claim 10

wherein two dichroic mirrors are oppositely positioned about the specimen upon the stage so that each does permit observation of at least some regions of the specimen's surface not directly observable along the viewing axis; and

wherein the illumination source serves to illuminate the specimen through each of the two dichroic mirrors;

wherein illumination directly reflected from the specimen

along the viewing axis permits an observation called a top view while radiation from the specimen reflected by each of the two dichroic mirrors simultaneously permits observations called left and right side views.

12. The improvement to a specimen holding and illuminating apparatus according to claim 10

wherein the illumination source serves to illuminate the specimen through the dichroic mirror with radiation suitable to induce fluorescent emission in the specimen.

13. The improvement to a specimen holding and illuminating according to claim 10 further comprising:

a selectively regionally transparent and opaque grid or rule mask, located between the dichroic mirror and the specimen upon the stage, selectively blocking both illumination from the illumination source passing through the dichroic mirror to the specimen, and also illumination reflected from the specimen as is further reflected by the dichroic mirror along the viewing axis, so that a grid pattern or rule scale visually appears upon an image of those regions of the specimen's surface that are illuminated through, and that are viewed through, the mask.

14. The improvement to a specimen holding and illuminating according to claim 10 further comprising:

a color filter located between the dichroic mirror and the specimen upon the stage.

15. The improvement to a specimen holding and illuminating according to claim 10 further comprising:

a fluorescent image calibration step wedge located between the dichroic mirror and the specimen upon the stage.

16. A method of illuminating a macroscopically-sized specimen for,

upon at least one time, observation along a single viewing axis, the method comprising:

supporting a specimen to be observed upon a stage;

first radiatively illuminating the specimen upon the stage so that at least some radiation directly reflected from the specimen will be returned along the viewing axis;

positioning a dichroic mirror so that at least a portion of the specimen not directly observable along the viewing axis will be reflected in the mirror so as to become observable along the viewing axis; and

second radiatively illuminating the specimen on the stage through the dichroic mirror so that at least some radiation reflected from that region of the specimen not directly observable along the viewing axis will become reflected by the dichroic mirror and will become observable along the viewing axis.

17. The method according to claim 16

wherein the positioning is of two dichroic mirror mirrors oppositely about the specimen upon the stage; and

wherein radiation directly reflected from the specimen along the viewing axis permits an observation called a top view while radiation from the specimen reflected by each of the two dichroic mirrors permits observations called left and right side views.

18. The method according to claim 16

wherein the first radiatively illuminating serves to directly illuminate the specimen upon the stage.

19. The method according to claim 16

wherein the first radiatively illuminating is with light from a fiber optic illumination source adequate to excite fluorescence.

20. The method according to claim 16 wherein

the first radiatively illuminating, or the second radiatively

illuminating, or both the first and the second radiative illuminating is with radiation suitable so as to induce fluorescent emission in the specimen.

21. The method according to claim 16 further comprising:

interposing a selectively regionally transparent and opaque grid or rule mask between the dichroic mirror and the specimen upon the stage so as to selectively block

radiation from the second radiatively illuminating en route from the dichroic mirror to the specimen, and also

some of this same radiation that, as reflected from the specimen, is en route from the specimen to the dichroic mirror, so that a grid pattern or rule scale will visually appear upon an image of those specimen regions that are illuminated through, and that are viewed through, the mask.

22. The method according to claim 16 further comprising:

interposing a color filter between the dichroic mirror and the specimen upon the stage.

23. The method according to claim 16 further comprising:

interposing a fluorescent image calibration step wedge between the dichroic mirror and the specimen upon the stage.